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FIGURE 1A

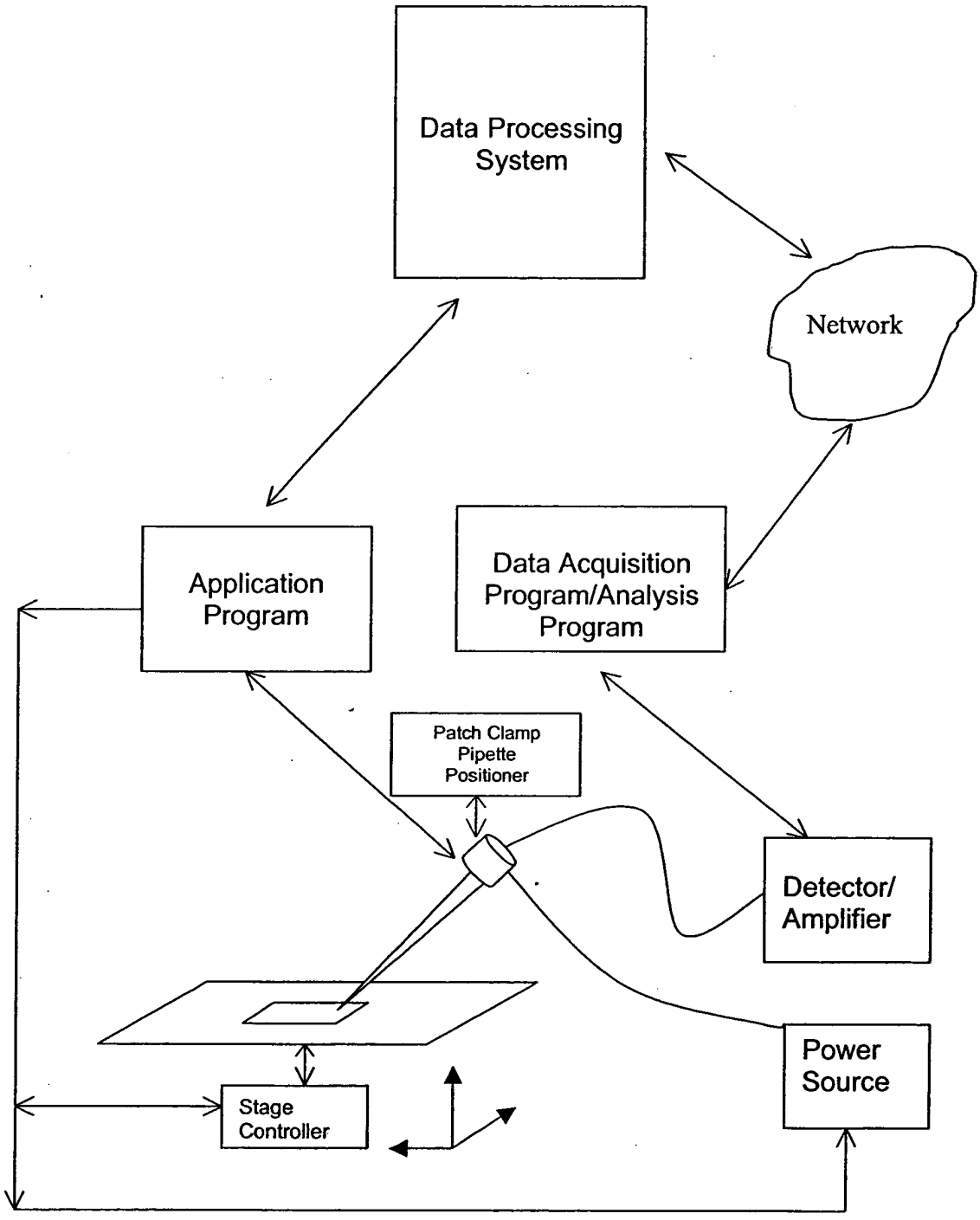

Data Processing System
Network
Application Program
Data Acquisition Program/Analysis Program
Patch Clamp Pipette Positioner
Detector/ Amplifier
Power Source
Stage Controller

FIGURE 1B

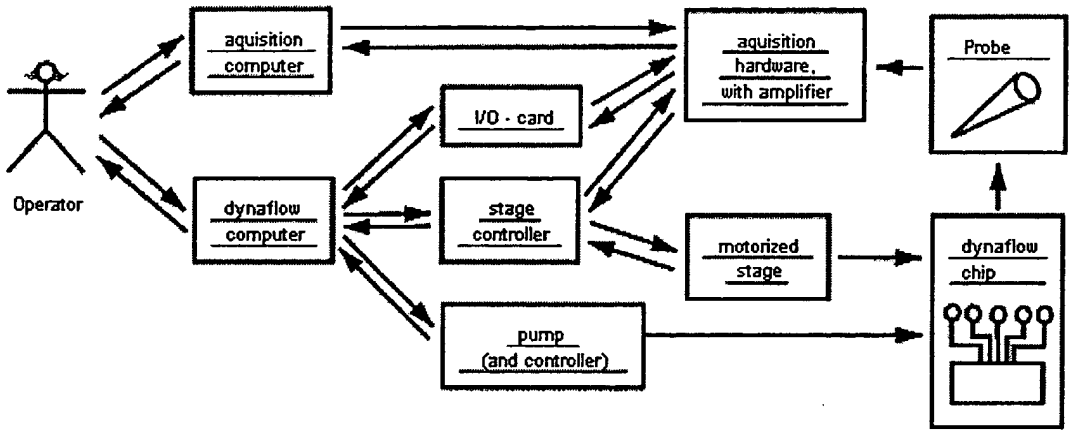

aquisition computer
aquisition hardware, with amplifier
Probe
I/O - card
Operator
dynaflow computer
stage controller
motorized stage
dynaflow chip
pump (and controller)

FIGURE 1C.

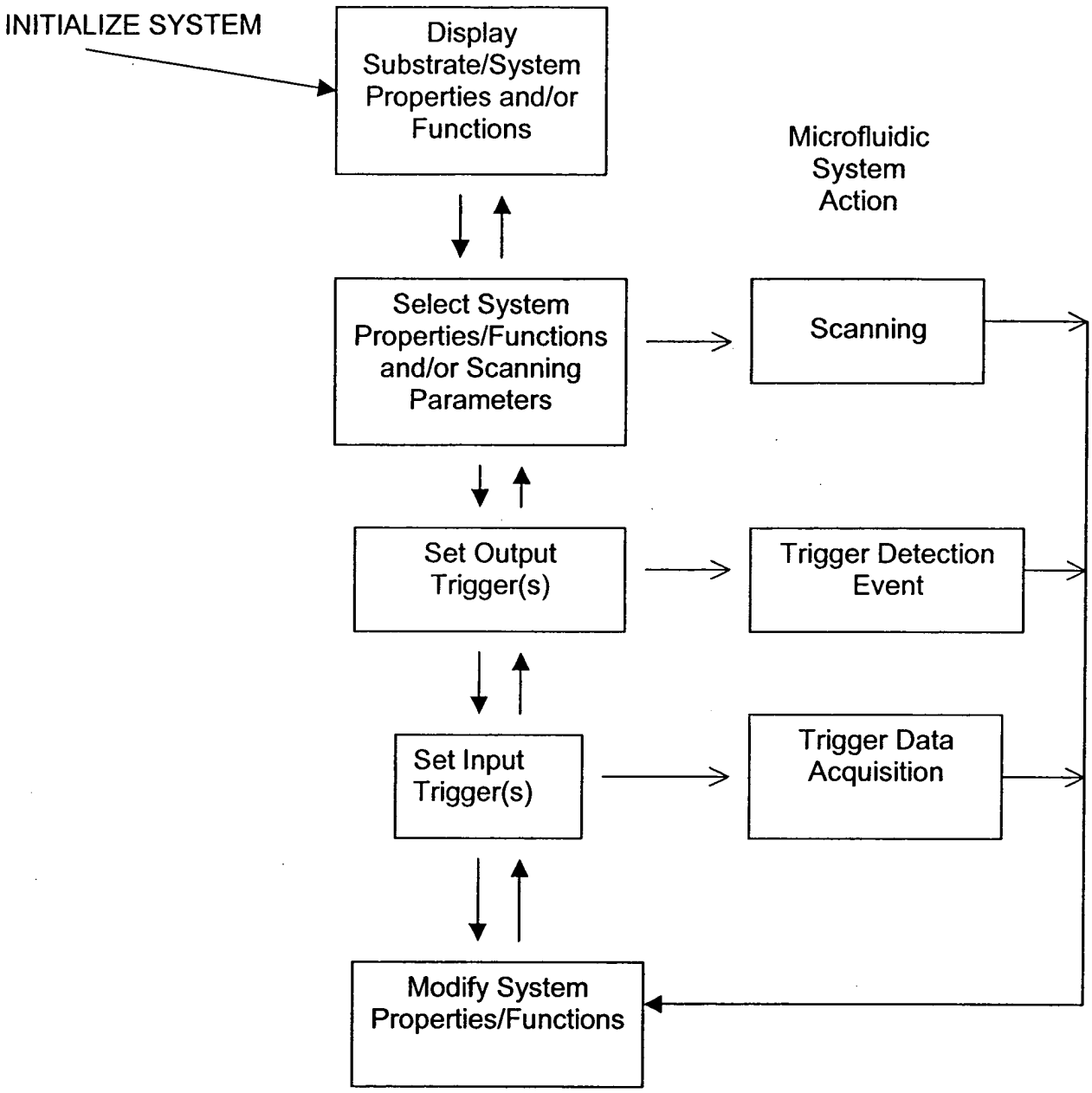

INITIALIZE SYSTEM
Display Substrate/System Properties and/or Functions
Microfluidic System Action
Select System Properties/Functions and/or Scanning Parameters
Scanning
Set Output Trigger(s)
Trigger Detection Event
Set Input Trigger(s)
Trigger Data Acquisition
Modify System Properties/Functions

FIGURE 1D

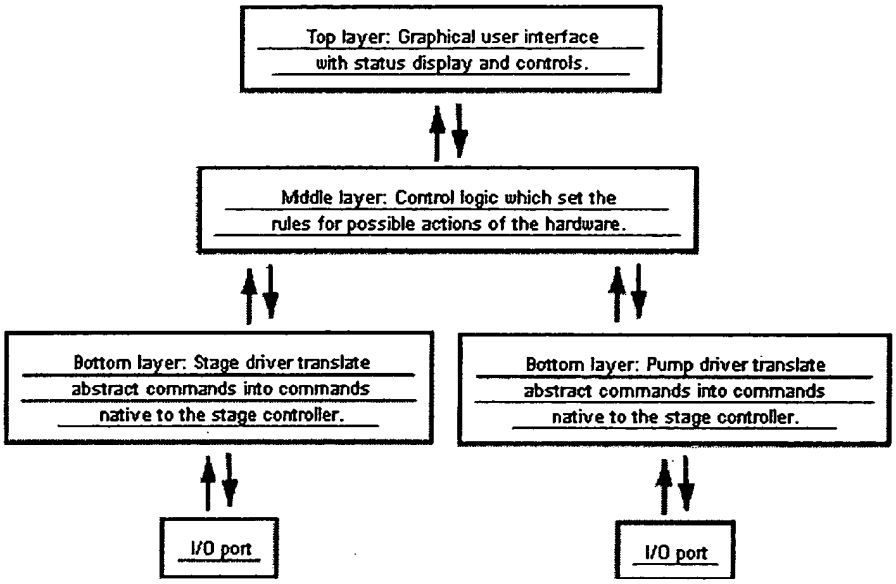

Top layer: Graphical user interface with status display and controls.
Middle layer: Control logic which set the rules for possible actions of the hardware.
Bottom layer: Stage driver translate abstract commands into commands native to the stage controller.
Bottom layer: Pump driver translate abstract commands into commands native to the stage controller.
I/O port
I/O port

FIGURE 2

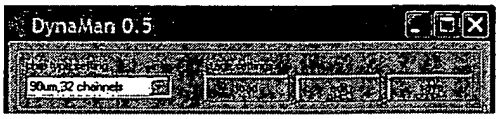
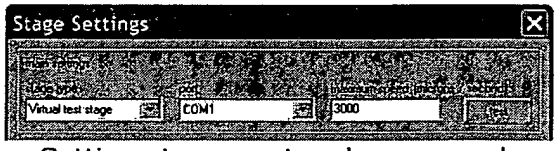
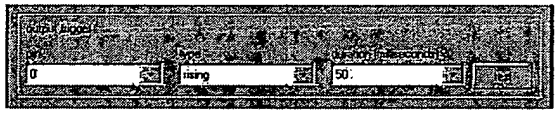


FIGURE 3



Setting stage, port and max speed.

FIGURE 4



Output trigger settings.

FIGURE 5

FIGURE 6A

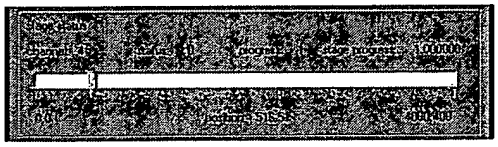
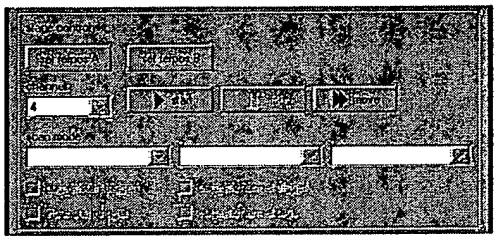


FIGURE 6B



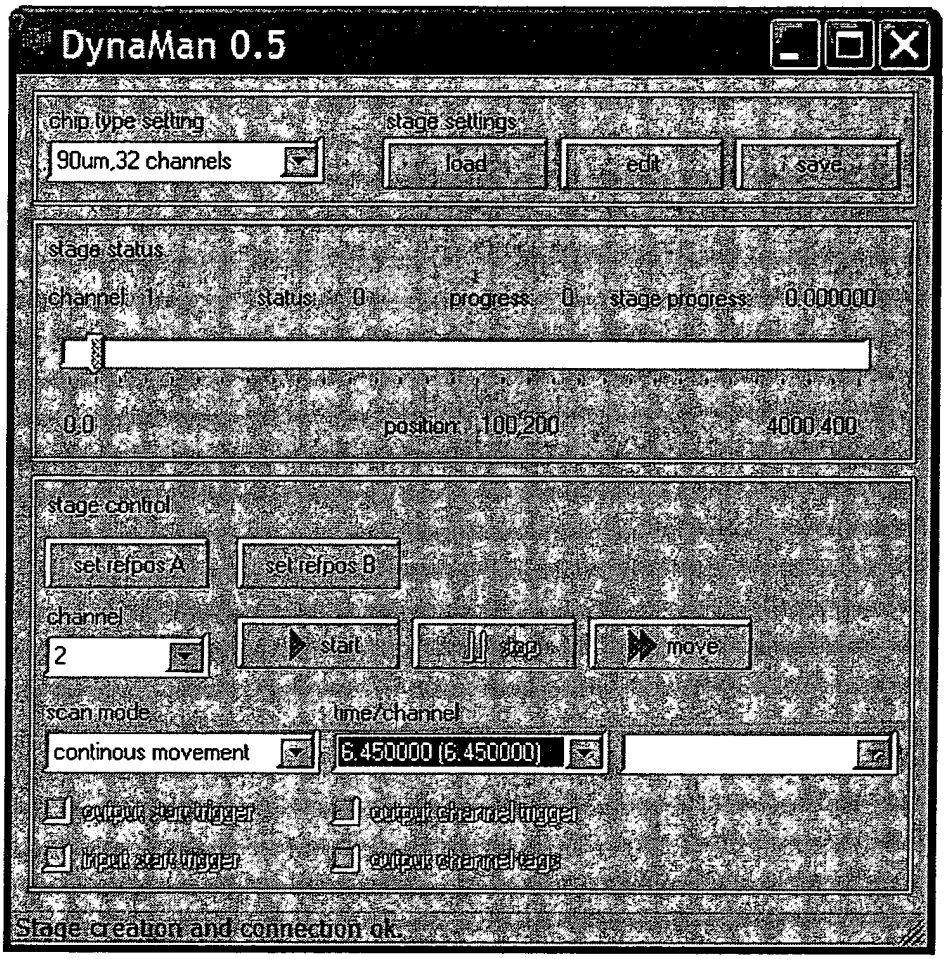

DynaMan 0.5
chip type setting
90um,32 channels
stage settings
load
edit
save
stage status
channel 1
status 0
progress 0
stage progress 0.000000
0.0
position 100,200
4000,400
stage control
set refpos A
set refpos B
channel
2
start
stop
move
scan mode
time/channel
continous movement
6.450000 (6.450000)
output start trigger
output channel trigger
input start trigger
output channel trigger
Stage creation and connection ok.

FIGURE 7

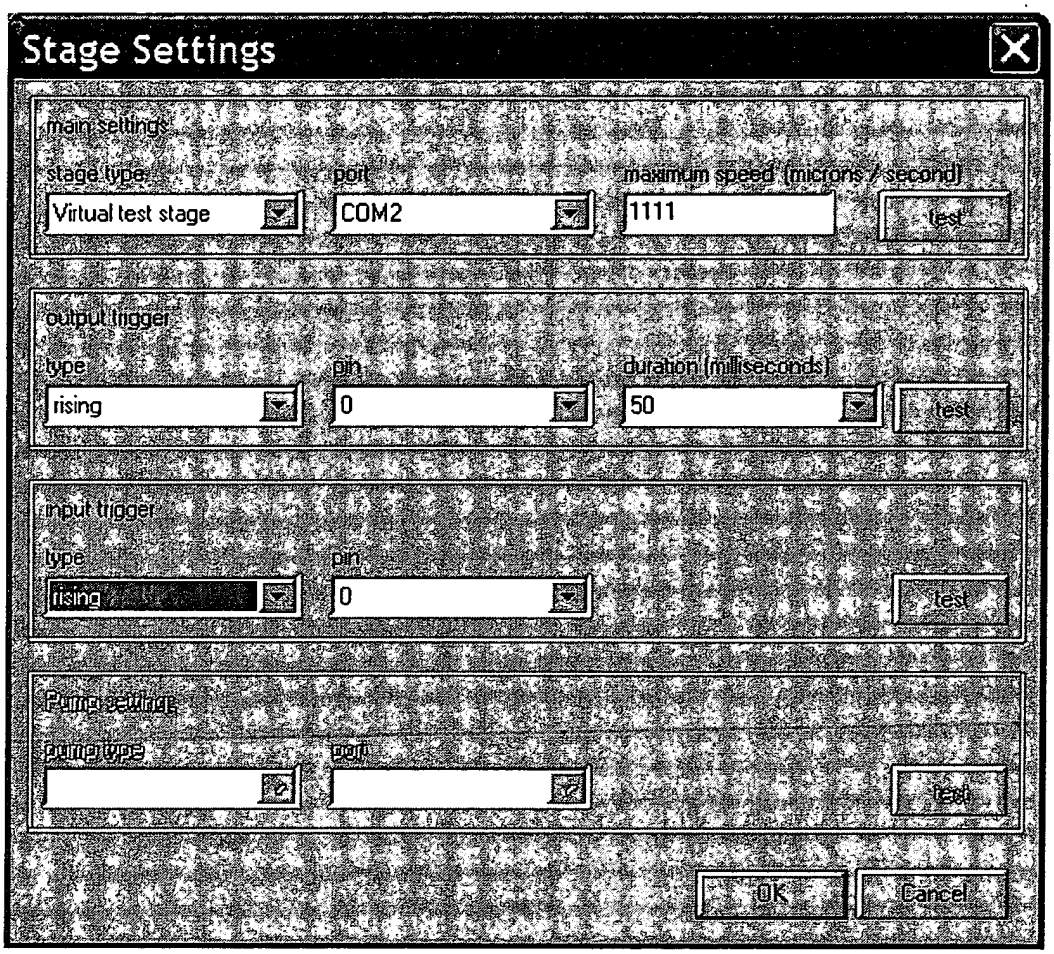
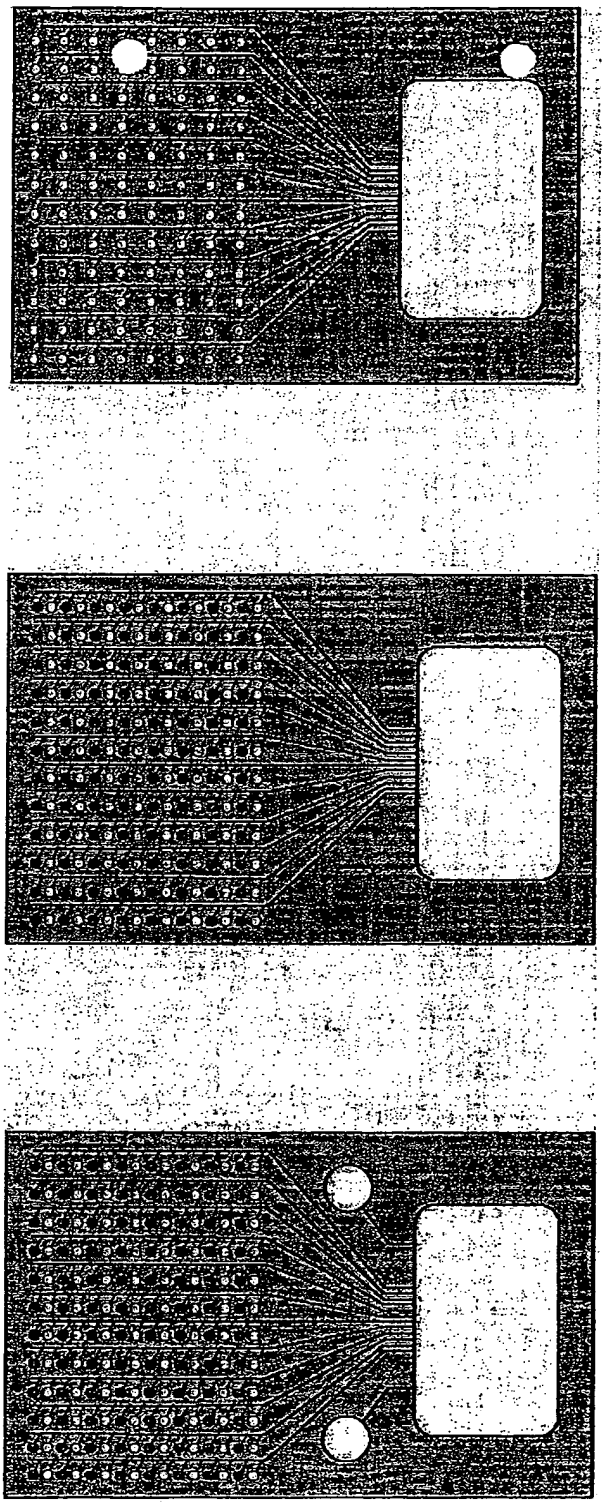

Stage Settings
main settings
stage type
Virtual test stage
port
COM2
maximum speed (microns / second)
1111
test
output trigger
type
rising
pin
0
duration (milliseconds)
50
test
input trigger
type
rising
pin
0
test
Pump setting
pump type
port
test
OK
Cancel

FIGURE 8



FIGURES 9A-C

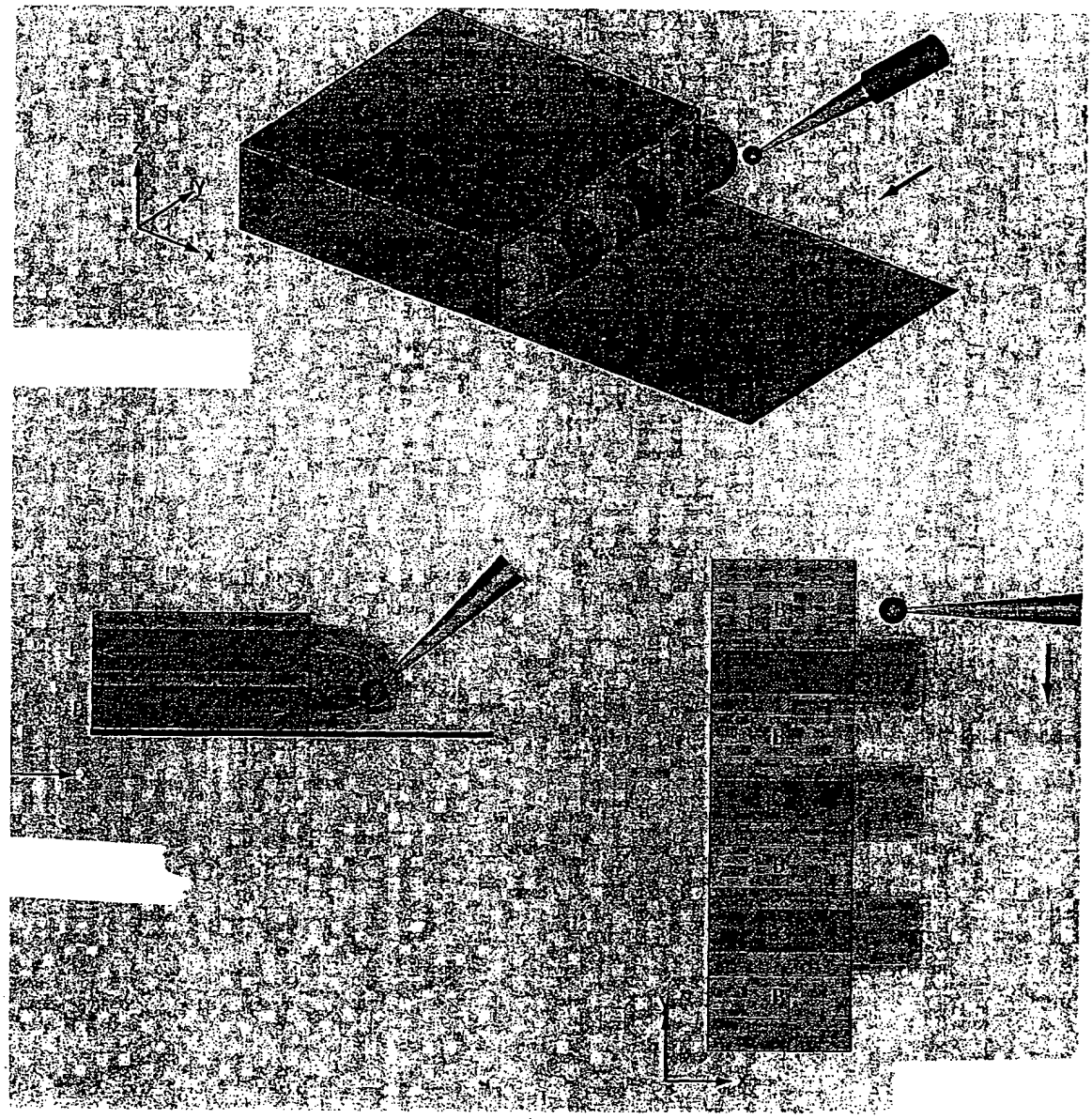
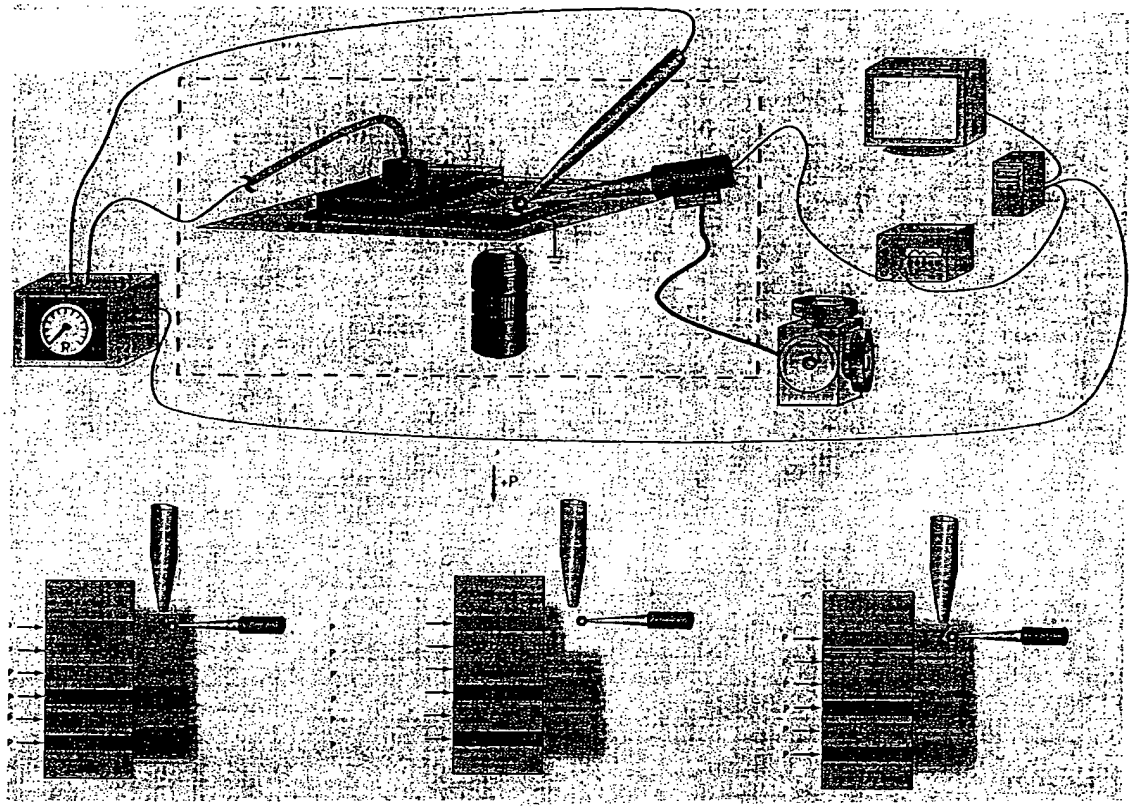


FIGURE 10 A-C



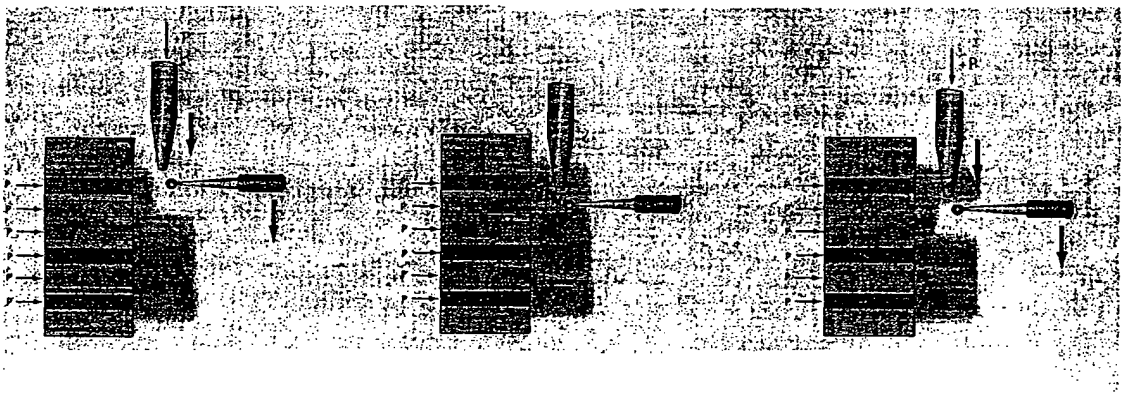


FIGURE 11A-G

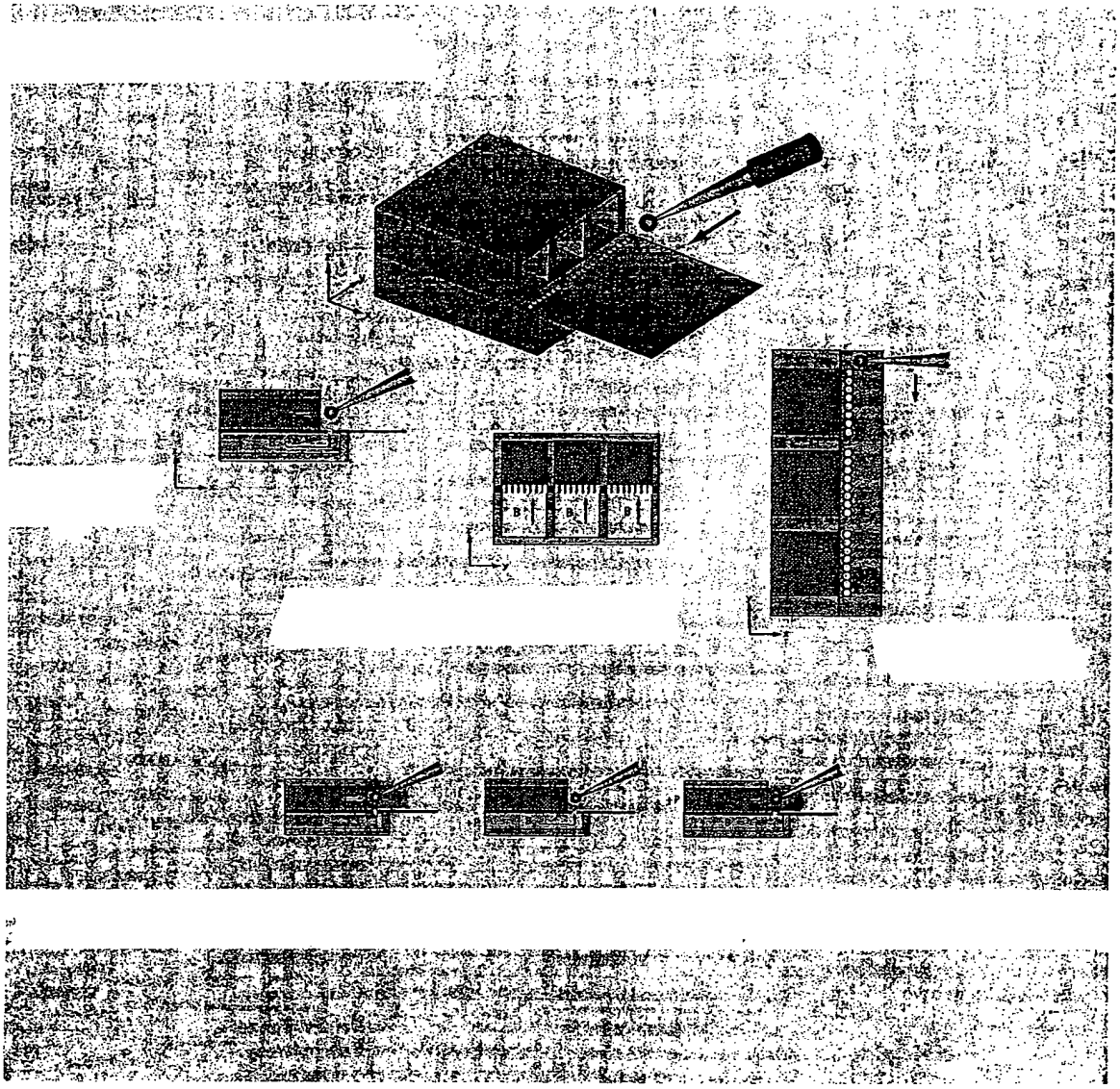


FIGURE 11H-N

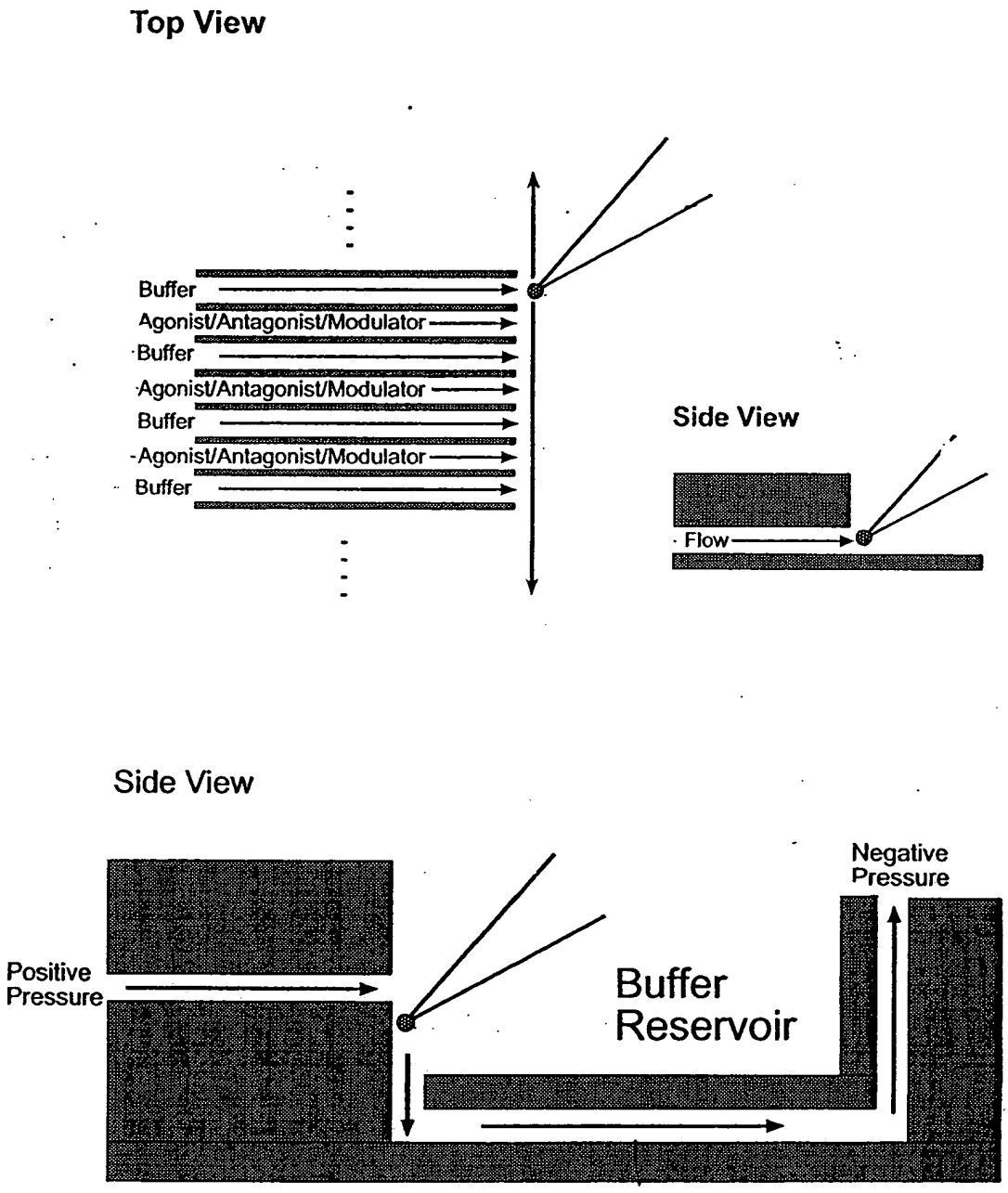

Top View
Buffer
Agonist/Antagonist/Modulator
Buffer
Agonist/Antagonist/Modulator
Buffer
Agonist/Antagonist/Modulator
Buffer
Side View
Flow
Side View
Positive Pressure
Buffer Reservoir
Negative Pressure

FIGURE 12A-C

Channel content	B	T1	T2	T3	B	α1	B	α 2	B	α 3	B	α 4	B	T2	B	α 5	B	α 6	B	α 7	B	α 8	B	T1	T2	T3
Channel #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

Simulated trace for a single forward scan across microfluidic channel outlets:

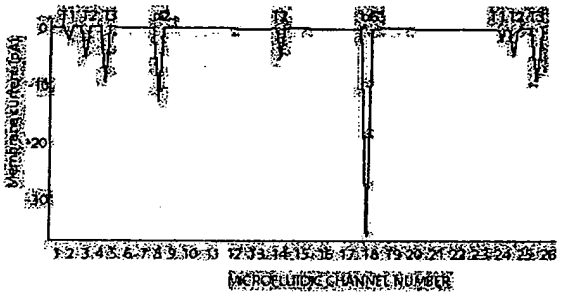


FIGURE 13A-B

Score sheet (mean peak current amplitude of 6 scans)

Receptor response	0	1	5	10	0	0	0	12	0	0	0	0	0	5	0	0	0	37	0	0	0	0	0	1	5	10
Channel #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

B=Buffer solution
T1= Test compound with known efficacy (agonist) at low concentration
T2= Test compound with known efficacy (agonist) at medium concentration (close to EC_{50}-value)
T3= Test compound with known efficacy (agonist) at high concentration (saturating concentration).
α=agonist with unknown efficacy

FIGURE 13C

Channel content	B	T1	T2	T3	α1	α2	α3	α4	α5	α6	α7	T1	T2	T3
Channel #	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Simulated trace for a single forward scan across microfluidic channel outlets.

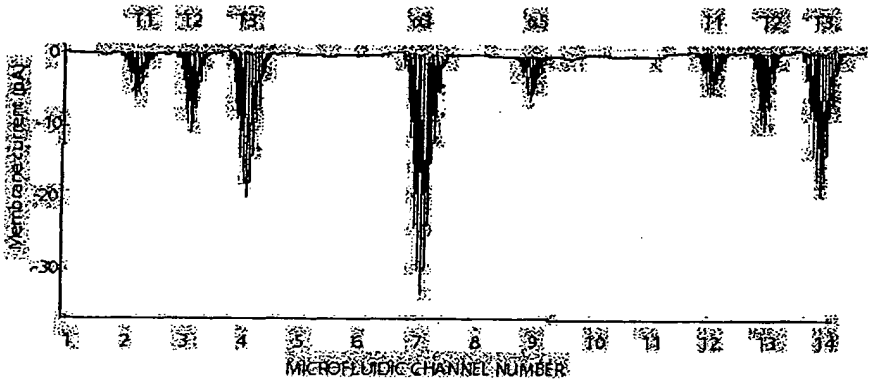


FIGURE 14A-B

FIGURE 14C

Score sheet (mean peak current amplitude of 6 scans)

Receptor response	0	5	10	20	0	0	34	0	4	0	0	5	10	20
Channel #	1	2	3	4	5	6	7	8	9	10	11	12	13	14

B=Buffer solution
T1= Test compound with known efficacy (agonist) at low concentration
T2= Test compound with known efficacy (agonist) at medium concentration (close to EC_{50}-value)
T3= Test compound with known efficacy (agonist) at high concentration (saturating concentration).
α=agonist with unknown efficacy

Content in channel	B	T1	T2	T 3	B	α1	B	α 2	B	α 3	B	α 4	B	T2	B	α 5	B	α 6	B	α7	B	α 8	B	T1	T2	T3	B	α9
Channel #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Content in channel	B	T1	T2	T 3	α 20	B	α 19	B	α 18	B	α 17	B	α 16	B	α 15	B	T2	B	α 14	B	α 13	B	α 12	B	α 11	B	α 10	B
Channel #	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29

Simulated trace for a single forward scan across microfluidic channel outlets:

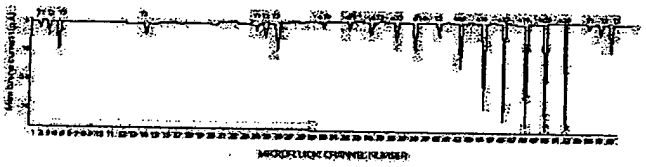


FIGURE 15A-B

Score sheet (mean peak current amplitude of 6 scans)

Receptor response	0	1	5	10	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	1	5	10	0	1
Channel #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Receptor response	0	1	5	10	36	0	35	0	32	0	27	0	24	0	15	0	5	0	12	0	8	0	6	0	3	0	2	0
Channel #	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31	30	29

B=Buffer solution
T1= Test compound with known efficacy (antagonist or agonist) at low concentration
T2= Test compound with known efficacy (antagonist or agonist) at medium concentration (close to EC_{50}-value)
T3= Test compound with known efficacy (antagonist or agonist) at high concentration (saturating concentration).
α1-to-α28 agonist with unknown efficacy at different concentration progressively diluted (each step 10 times) to α1

FIGURE 15C

Channel content	B + A	T 1+ A	T 2+ A	T 3+ A	B + A	A +ζ 1	B + A	A +ζ 2	B + A	A +ζ 3	B + A	A +ζ 4	B + A	T2 + A	B + A	A +ζ 5	B + A	A +ζ 6	B + A	A +ζ 7	B+ A	A+ ζ8	B+ A	T1	T2	T3
Channel #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

Simulated trace for a single forward scan across microfluidic channel outlets:

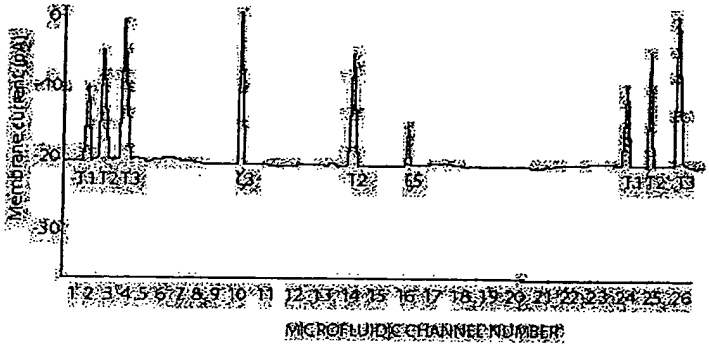


FIGURE 16A-B

Score sheet (mean peak current amplitude of 6 scans)

Receptor response	20	10	5	1	20	20	20	20	20	1	20	20	20	5	20	15	20	20	20	20	20	20	20	10	5	1
Channel #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

B=Buffer solution
T1= Test compound with known efficacy (antagonist) at low concentration
T2= Test compound with known efficacy (antagonist) at medium concentration (close to EC_{50}-value)
T3= Test compound with known efficacy (antagonist) at high concentration (saturating concentration).
A=agonist with known efficacy
ζ=antagonist with unknown efficacy

FIGURE 16C

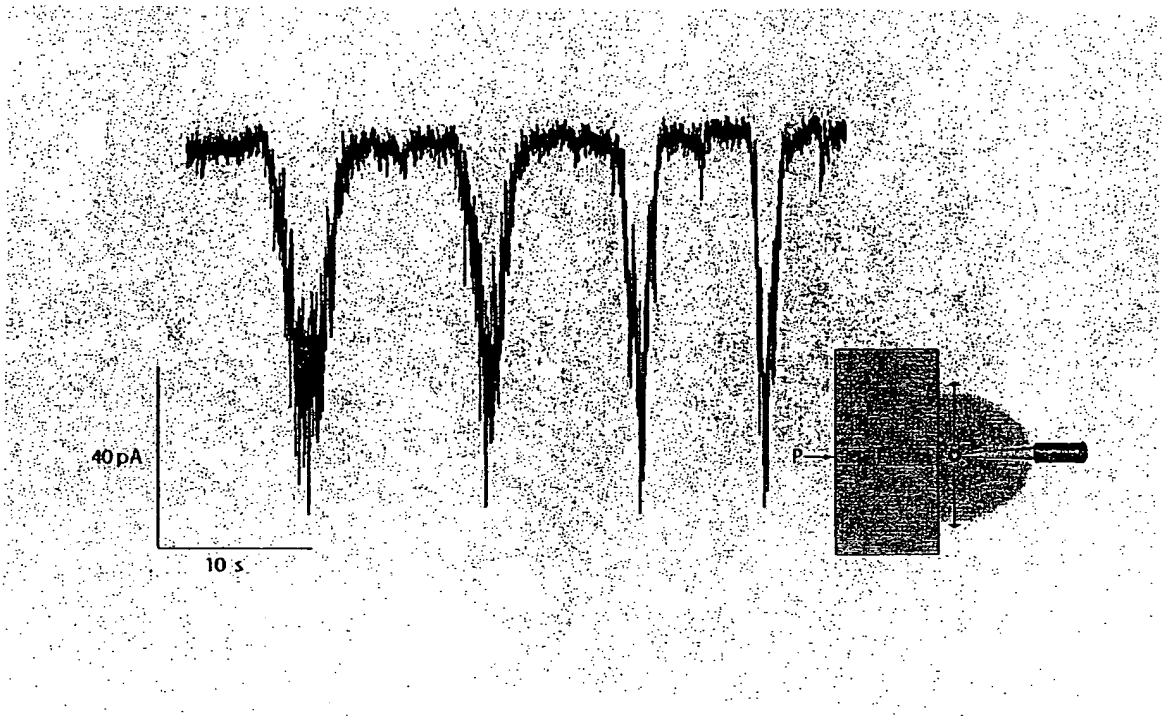


Figure 17

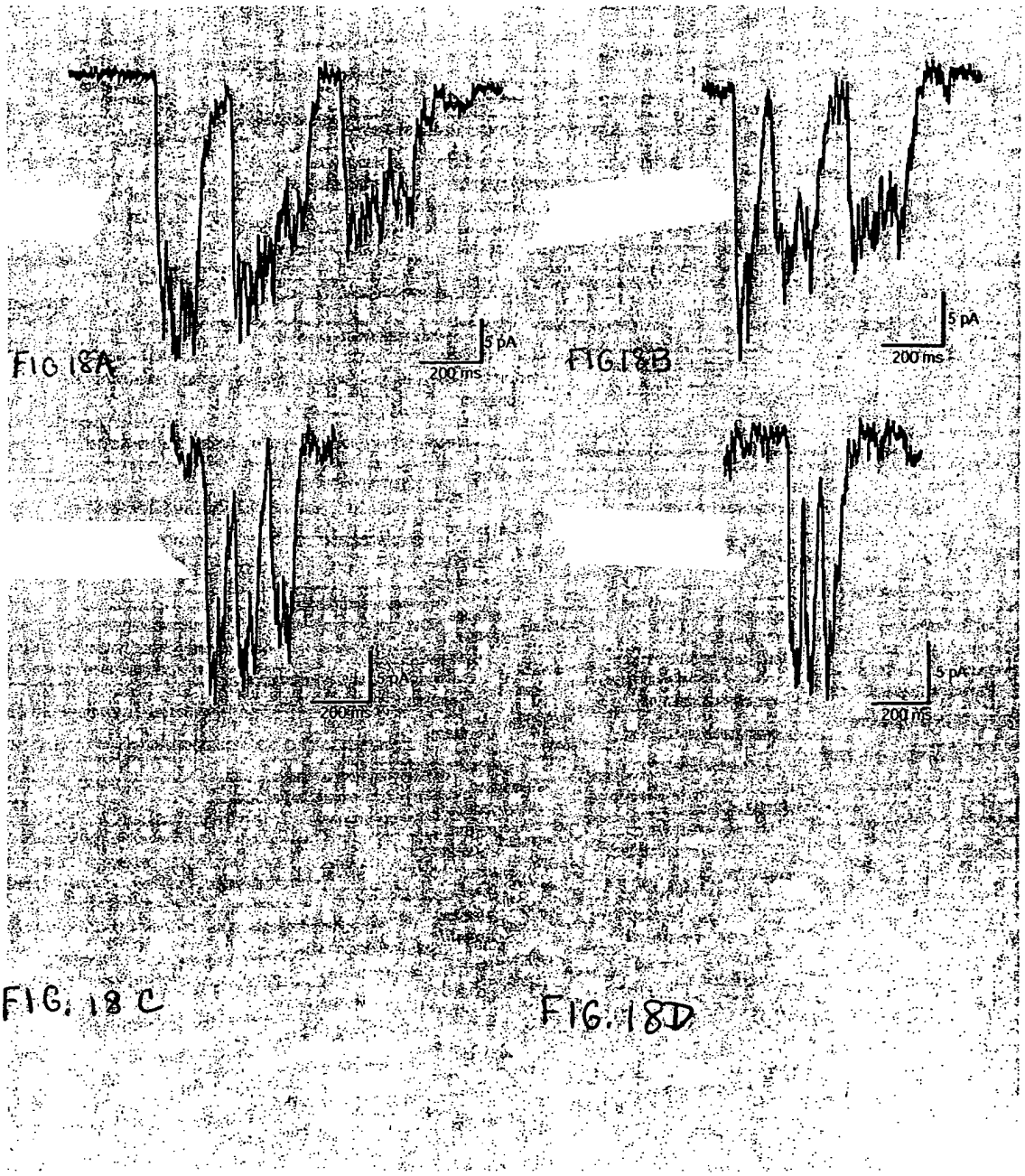
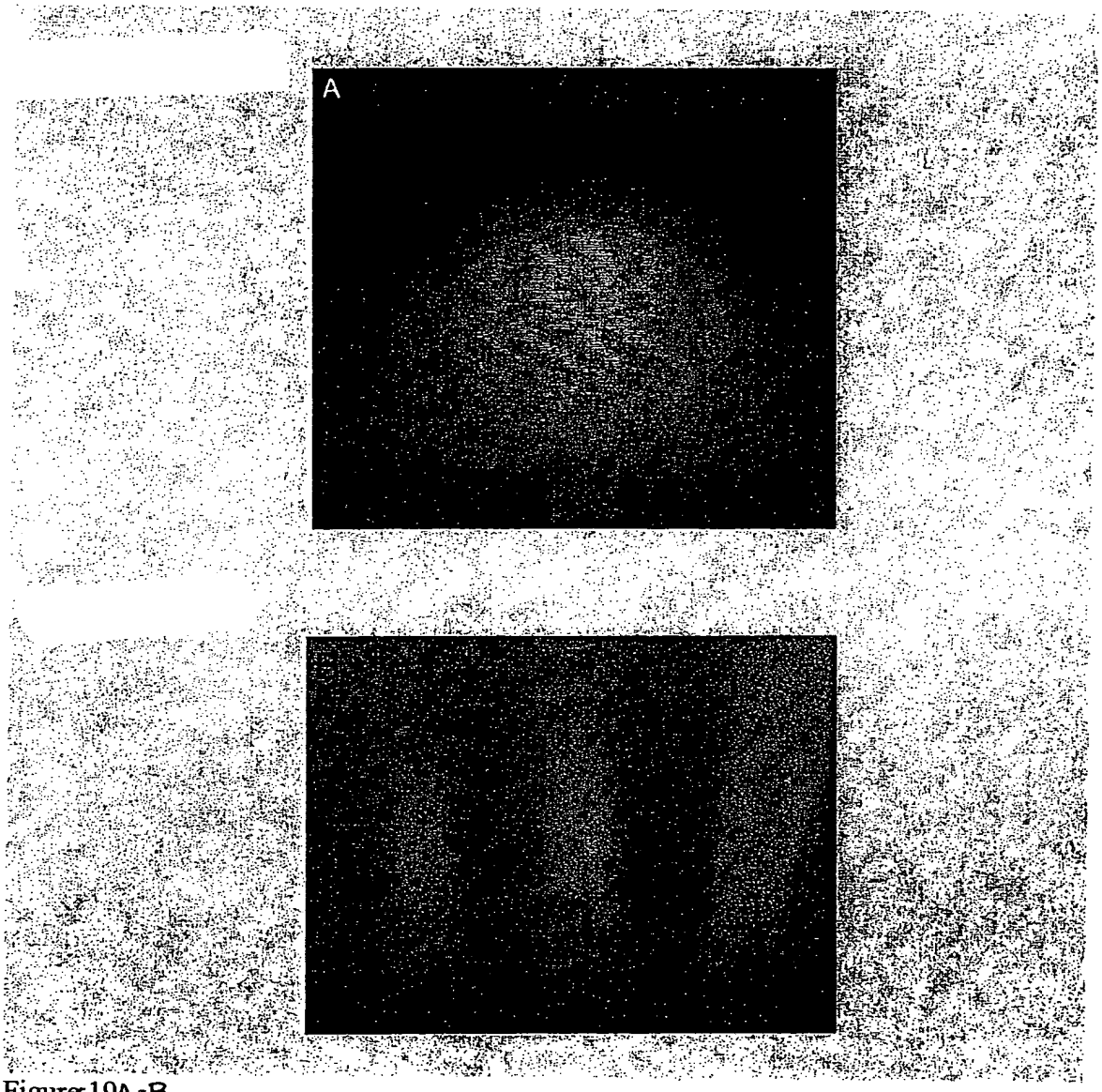


FIG 18A
5 pA
200 ms
FIG 18B
5 pA
200 ms
5 pA
200 ms
5 pA
200 ms
FIG. 18 C
FIG. 18D

FIGURE 18



Figures19A-B

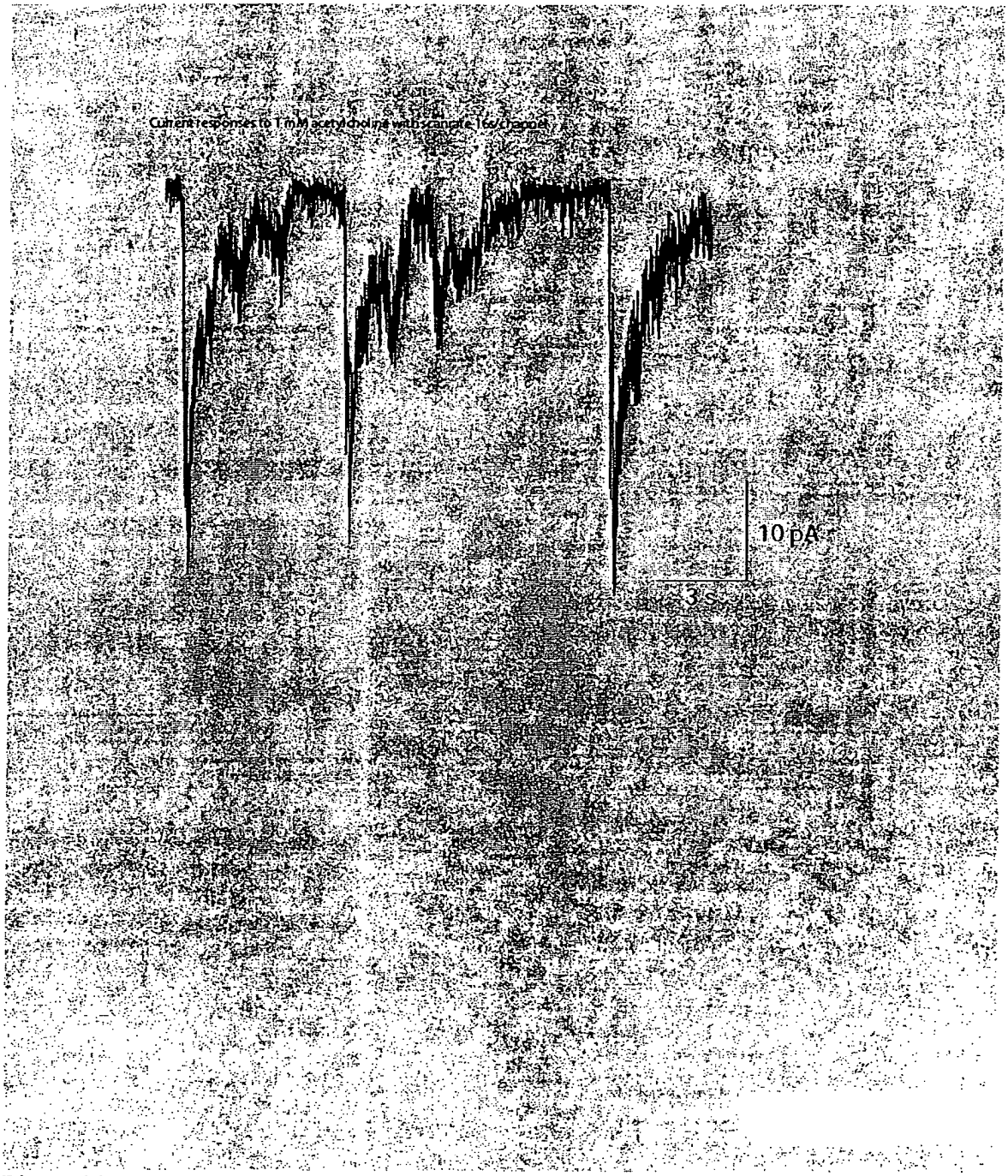

Current responses to 1 mM acetylcholine with nicotinic 16α channel
10 pA
3 s

Figure 20

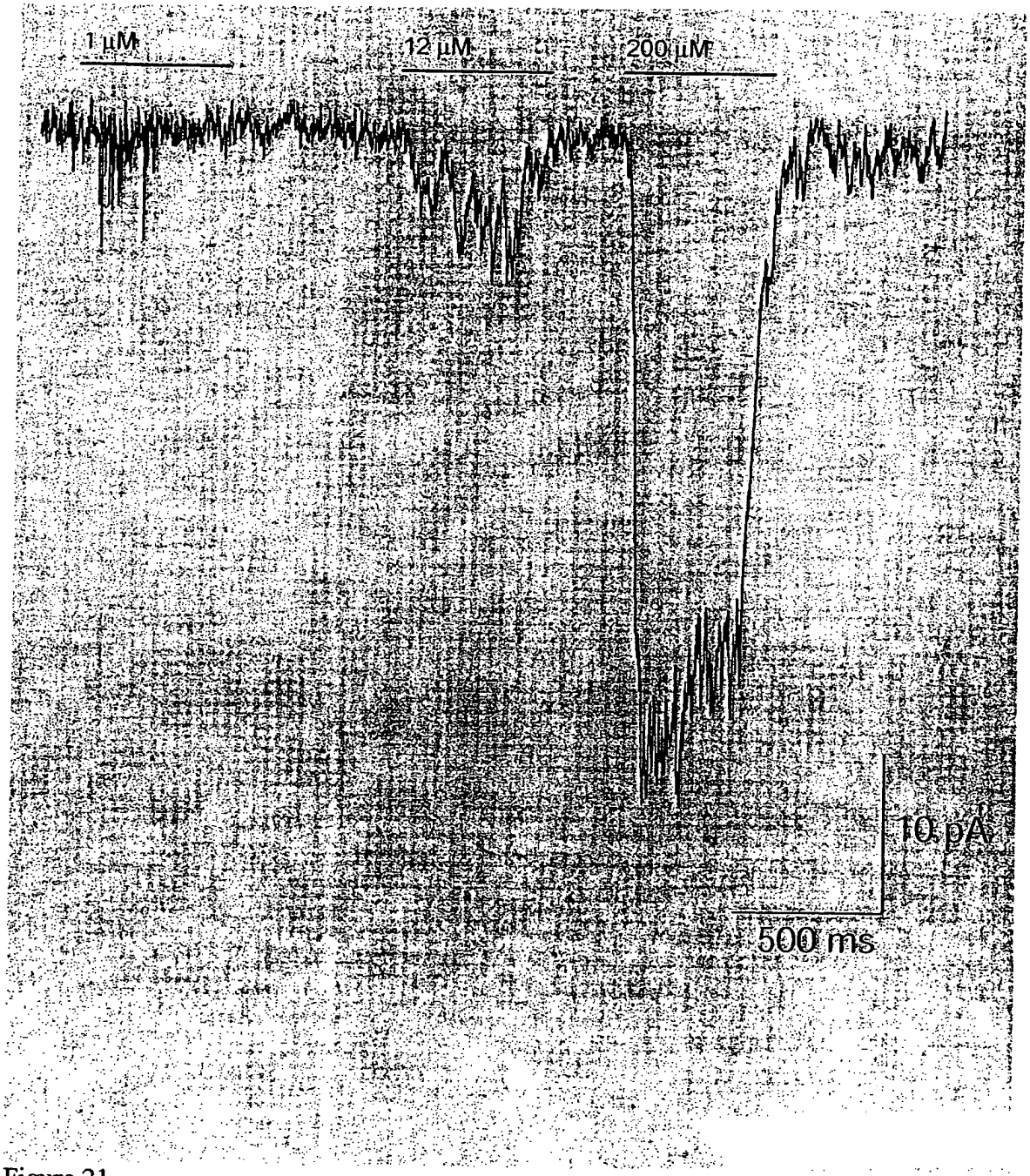


Figure 21